FLEXIBLE BAG WITH LOCATORS

RELATED APPLICATIONS

This application claims priority to United States Provisional Patent Application 60/545,122 filed February 17, 2004, and to United States Patent Application 11/031,243, filed January 6, 2005 as a continuation application, United States Patent Application 11/031645 filed January 7, 2005 as a continuation application. The entirety of each application is incorporated by reference.

FIELD OF THE INVENTION

This invention generally relates to the art of dispensing product and, particularly, to a dispensing system with a roller assembly.

BACKGROUND OF THE INVENTION

The ability to dispense a controlled quantity of a condiment, such as ketchup, mustard, relish, mayonnaise, salad dressings, hot wings sauce, spaghetti sauce, tartar sauce or other sauces, in an efficient manner has been important in the food service industry for many years. This is especially true for large volume food handling operations such as fast food restaurants, where employees and customers desire the ability to dispense condiments quickly and conveniently, and where even a marginal reduction in the waste of, or time required to dispense, condiments leads to significant savings in cost.

Dispensing condiments from large, flexible plastic bags is advantageous. Condiments can be easily packaged in large plastic bags at a central facility and shipped to the point of sale. Bulk plastic containers can incorporate gas barriers that allow condiments to be packaged so that they can be stored at room temperature, which makes the packages more convenient to ship and store. Storing the condiments at room temperature saves time when it is desirable that the condiment be served at room temperature by eliminating the requirement that the condiment be allowed to warm from a refrigerated temperature before use.

Flexible plastic bags are a common form of packaging for food and thus are readily handled by employees without special training. Further, storing the condiments at room temperature reduces the expense of refrigeration. In addition, bags are often more cost effective, easier to dispose of, and occupy less storage space.

Historically, many products and condiments have been shipped and stored in tin cans, often #10 tin cans. While tin cans offer good shelf life performance, tin cans contribute to waste of product that clings to the side of cans. Further, tin cans are heavy to ship, store, and are heavy and voluminous for disposal. Additionally, tin cans require can openers to open – retrieving the opener reduces operational speed, and the opener may be difficult to locate, further reducing efficiency. Opening tin cans may also result in sharp edges that may tear garbage bags and pose a laceration risk.

Other historical containers include gallon jugs and caulk cartridge type cans. However, gallon jugs contribute to waste in the same fashion as tin cans, and share many of the negative attributes of tin cans. Caulk cartridge type cans leave less product in the canister, but require priming of each can and generate significant wasted product. For example, a 25-ounce cartridge delivering a one-ounce payload necessarily wastes 4% of the product due to priming.

Devices attempting to efficiently dispense condiments from bulk flexible plastic bags exist, including devices that use rollers advanced by gravity, by gears or rack and pinion means to squeeze condiment out of the plastic bags, but these devices have several disadvantages. Devices that use gravity actuated rollers or gears are complicated to manufacture and may involve manipulating the rollers in non-intuitive ways. Other devices that utilize more complex means for releasing condiment from the bags require that the bags incorporate specially designed fittings, including tubes and couplings, which increase the cost and complexity of the packaging and add to product waste during cleanup. Yet other devices use motorized pumps that require electricity

and possibly pressurized gases to operate, which adds to the cost and size of the dispensers, increasing manufacturing costs and adding complexity during cleaning. Further, pumps may result in undesired splatter, which both wastes product, as well as work effort to clean the splatter. If a pump in the front of the store splatters, customers may become unhappy. Motorized devices often require long tubes that contribute to waste of the condiment and complicate clean up. Furthermore, existing types of dispensers have a single outlet for the condiment, which reduces efficiency at workstations where multiple outlets can be accommodated. Additionally, tubes reduce the range of movement and freedom of motion of the applicator device. Additionally, devices using pressurized gas rely on the gas, and in event of gas malfunction, or lack of gas supply, the device is non-functional.

Other devices utilize fitments that require significant expense, and contribute to waste if the fitment is improperly fitted. For example, a plastic fitment is used to provide a valve to a flexible bag. For use, the fitment must be separately manufactured, and heat sealed to a flexible bag.

However, accurately fitting a flexible bag into any of these dispensers has been problematic. An appropriate fit of the bag within a dispensing device is important to ensure correct insertion, as well as minimizing waste and potentially damaging the package during use. It is further desirable to minimize the time required to insert the bag, while simultaneously increasing the accuracy of the insertion. It is also desirable to provide a bag that minimizes clean up and disposal costs. It is further desirable that the bag can be manufactured on a variety of packaging machines with the insertion of customized seal jaws to create spouts, locator pins and tear notches.

The present invention advances the art.

BRIEF SUMMARY OF THE INVENTION

One embodiment of the invention provides a system for dispensing product including a track support and a roller assembly slidably engaged with the track support. The system further includes a valve assembly attached to a base portion of the track support, wherein a flexible product filled bag is retainable between by the roller assembly and wherein the roller assembly translates down the track support to force the product toward the valve assembly.

Another embodiment of the invention provides a method of dispensing product including securing a flexible product filled bag in a roller assembly and translating a roller assembly relative to the product filled bag. The method further includes forcing product within the bag toward a valve assembly and dispensing product through the valve assembly.

Yet another aspect of the invention provides a roller assembly for dispensing product from a bag. The roller assembly includes a roller frame, a first knurled roller rotatably attached to the frame, and a second knurled roller attached to the frame, the second knurled roller positioned adjacent the first knurled roller to form a nip. In addition, the roller assembly includes an actuator operably attached to one of the first and second roller, wherein product from a bag positioned in the nip is dispensed as the first and second rollers rotate responsive to rotation of the actuator.

Yet another aspect of the invention provides a roller assembly for dispensing product from a bag. The roller assembly includes a roller frame, a first roller rotatably attached to the frame, and a second roller rotatably attached to the frame, the second roller positioned adjacent the first roller to form a . The roller assembly further includes an actuator operably attached to one of the first and second roller, wherein rotation of the actuator directly rotates the rollers and simultaneously translates the rollers relative to a product filled bag positioned in the nip to dispense food product.

The foregoing and other features and advantages of the invention will become further apparent from the following detailed description of the presently preferred embodiments, read in conjunction with the accompanying drawings. The detailed description and drawings are merely illustrative of the invention rather than limiting, the scope of the invention being defined by the appended claims and equivalents thereof.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

FIG. 1 is a back view of one embodiment of a system in accordance with one embodiment of the invention;

FIG. 1A is a perspective view of one embodiment of a bag in accordance with one aspect of the invention;

FIG. 1B is a perspective view of one embodiment of a bag in accordance with one aspect of the invention;

FIG. 2A is a front view of one embodiment of a system in accordance with one embodiment of the invention;

FIG. 3A is a cross-sectional view of one embodiment of a dispenser in accordance with the invention;

FIG. 3B is an exterior view of the bottom of one embodiment of a dispenser in accordance with the invention;

FIG. 4 is a view of one aspect of a system in accordance with one embodiment, of the invention;

FIG. 5 is a view of one embodiment of a system in accordance with one embodiment of the invention; and

FIG. 6 is a view of one embodiment of a system in accordance with one embodiment of the invention;

FIG. 7 is a bottom view of one embodiment of a system in accordance with one embodiment of the invention;

FIG. 8 is a view of one embodiment of a system in accordance with one embodiment of the invention;

FIG. 9 is a perspective view of one embodiment of a system in accordance with one aspect of the invention;

FIG. 10 is a perspective view of one embodiment of a system in accordance with one aspect of the invention;

FIG. 11 is a perspective view of one embodiment of a system in accordance with one aspect of the invention;

FIG. 12 is a perspective view of one embodiment of a system in accordance with one aspect of the invention;

FIG. 13 is a perspective view of one embodiment of a system in accordance with one aspect of the invention;

FIG. 14 illustrates a perspective exploded view of one embodiment of a dispenser in accordance with one aspect of the invention;

FIG. 15 illustrates a cross sectional exploded view of one embodiment of a dual knife blade pump assembly in accordance with one aspect of the invention;

FIGS. 16A and 16B illustrate perspective views of one embodiment of removable cap in accordance with one aspect of the invention;

FIG. 16C illustrates a top view of one embodiment of a dispenser support in accordance with one aspect of the invention;

FIG. 16D illustrates a perspective view of one embodiment of a dispenser support in accordance with one aspect of the invention

FIG. 16E illustrates a perspective view of one embodiment of a removable cap in accordance with one aspect of the invention;

FIG. 16F illustrates another embodiment of a pump assembly in accordance with one aspect of the invention;

FIGS. 17 and 18 illustrate one embodiment of operation of a dispenser with a dual knife blade pump assembly in accordance with one aspect of the invention;; and

FIG. 19 illustrates one embodiment of a method for dispensing particulate condiment in accordance with one aspect of the invention.

DETAILED DESCRIPTION

FIG. 1 illustrates a system 10 in accordance with one embodiment of the invention. System 10 includes a frame 20, top clip 30, roller frame 40, and valve assembly 50. System 10 further includes housing 5 (see FIG. 6) and dispenser 310 (see FIGS. 3A and 3B). In one embodiment, flexible bag 90 is retained and supported, at least in part, by top clip 30 and held within roller assembly 40.

Housing 5 is operable to support frame 20. In one embodiment, housing 5 is a freestanding unit, configurable to rest upon, for example, a tabletop. In another embodiment, housing 5 is configured as a wall-mounted unit. In one embodiment, frame 20 includes a male adaptor configured to mate with a female adaptor in housing 5 for a sliding engagement between frame 20 and housing 5. In one embodiment, frame 20 includes a female adaptor configured to mate with a male adaptor in housing 5 for a sliding engagement between frame 20 and housing 5. Embodiments with a female adaptor on the frame 20 may have a groove, such as groove 101 depicted in FIGS. 6 and 7, in either the top of the frame (such as, for example, top clip 30), the bottom of the frame (such as, for example, valve assembly 50), or both. Housing 5 may comprise any appropriate material. In food applications, stainless steel or food grade plastics may offer advantages, while in other applications, another material, such as, for example, plastic, food grade plastics, or PVC plastic may offer superior performance. In another embodiment, housing 5 includes a support ledge for supporting a handheld dispenser such that the contents of a bag may be dispensed into the interior of the handheld dispenser. In one embodiment, the handheld dispenser is as illustrated in FIGS. 3A and 3B.

Frame 20 comprises two sides 21 connecting top clip 30 and valve assembly 50. Frame 20 further includes slide support 26. In one embodiment, sides 21 are disposed substantially at opposite ends of top clip 30 and valve assembly 50, forming an approximately quadrilateral configuration. In one embodiment, sides 21 include grips configured to conform to human fingers to provide easy handling. . In one embodiment, sides 21 are smooth and non-scalloped. In one embodiment, track support 26 connects top clip 30 and valve assembly 50 at approximately a midpoint of a length L of top clip 30 and valve assembly 50. Frame 20 is sized so that a flexible bag carried within the frame extends substantially from the top clip 30 to the valve assembly 50, with the top clip 30 supporting the bag and valve assembly 50 controlling the dispensing of product contained by the bag

Slide support 26 includes a base portion 27 and top portion 28. Base portion 27 is attached to the valve assembly 50. Top portion 28 is affixed to top clip 30. Track support 26 is configured, in an example, so that roller frame 40 is slidably engaged and translates axially along track support 26 via a bearing surface of the roller frame 40. In one embodiment, roller frame 40 translates freely along track support 26. In another embodiment, the interface between roller frame 40 and track support 26 comprises any variety of bearing configurations including a frictional grip, low friction interface, teeth, or ratchets. Track support 26 with base portion 27 and top portion 28 is illustrated in FIG. 1 engaged with roller frame 40. In one embodiment, track support 26 is configured for snap in and out attachment with top clip 30 and valve assembly 50.

Top clip 30 includes front 24 hingedly attached to back 25. In a closed configuration, front 24 and back 25 are positioned parallel and positioned adjacent each other. In an open configuration, front 24 and back 25 are non-parallel. In one embodiment, front 24 is secured to back 25 with a latch assembly 23. In one embodiment, latch assembly 23 is integral with the front 24 and back 25. In another embodiment, latch assembly 23 includes a spring 22 operable to bias front 24 and back 25 into an open configuration. In one embodiment, back 25 is configured to be fixed relative to frame 10, while front 24 is configured to open and close relative to back 25.

Roller frame 40 includes a first roller arm 41 and a second roller arm 42. While in a closed configuration, first roller arm 41 and second roller arm 42 are positioned parallel and adjacent each other. In an open configuration, first roller arm and second roller arm 42 are non-parallel. First roller arm 41 and second roller arm 42 are hingedly attached at one end of each. In one embodiment, first and second roller arms are hingedly attached at the same end as front 24 and back 25. First roller arm 41 and second roller arm 42, in one embodiment, are maintained in a closed configuration with a latch assembly 39 (FIG. 2A). In one embodiment, the latch assembly includes a spring operable to bias the first and second roller arms into an open configuration. In one embodiment first roller arm 41 and second roller arm 42 are rotatably attached to the frame 40. In another embodiment, first roller arm 41 is rotatably attached to frame 40 and second roller arm 42 is attached to frame 40.

First roller arm 41 includes a roller 43 axially disposed with first roller arm 41 and rotatably affixed to the first roller arm. Second roller arm 42 includes a roller 44 axially disposed with second roller arm 42 and rotatably affixed to the second roller arm 42. Each roller 43, 44 is rotatably attached to roller frame 40. Roller frame 40 is configured to translate along track support 26, and includes a bearing surface in second roller arm 42. In one embodiment, second roller arm 42 is omitted, and roller 44 remains rotatably attached to roller frame 40. In

embodiments including a second roller arm 42, second roller arm 42 provides additional strength or support for roller 44. In embodiments without second roller arm 42, roller 44 is configured to be sufficiently strong as to obviate a need for second roller arm, and configured for latching attachment to roller frame 40.

When in a closed configuration, first and second arms 41, 42 are configured to retain a flexible bag containing product. When in a closed configuration, roller arms 43, 44 form a nip 45. As first and second rollers 43, 44 rotate, product from a bag positioned in the nip is dispensed through a spout in the bag and through valve assembly 50.

Roller 43 is operably attached to an actuator 46. Rotation of the actuator 46 directly rotates roller 43, roller 44 rotates in response to rotation of roller 43, and simultaneously translates the rollers 43, 44 relative to a product filled bag positioned in the nip to dispense food product. In one embodiment, actuator 46 is a knob. In another embodiment, actuator 46 is a lever. In one embodiment, actuator 46 is manually actuated, while in another embodiment, actuator 46 is actuated with mechanical, electrical, pneumatic, or magnetic assistance. In one embodiment, actuation of actuator 46 results in vertical translation of the roller frame along track support 26. In one embodiment, actuator 46 comprises a portion of an actuator assembly 49. In one embodiment, actuator assembly 49 includes a spring biasing the actuator 46 to a closed configuration.

In one embodiment, at least one of the rollers 43, 44 comprises a knurled region 47. FIG. 2A depicts knurled region 47. In one embodiment, the knurled region 47 extends along substantially all of a length of the roller. In another embodiment, at least one of the rollers 43, 44 includes a relief region 48 that is not knurled. FIG. 2A best depicts relief region 48. In one embodiment, a relief region 48 includes a covering, such as, for example, an elastomeric or rubber sleeve to increase friction between the relief region 48 and a complementary region on the other roller. In other embodiments, the interface between relief region 48 and knurled region 47 reduces adverse effects on the material of a

bag, such as bag 90, in the event that the material bunches up in the interface. In other embodiments, the covering is configured for a smooth, relatively high friction surface to interface with the other roller. In embodiments where the relief region 48 is a sleeve, the sleeve may be adhesively applied to the roller. As used herein, a "knurl" is a protrusion that is regularly spaced but does not extend axially along a substantial portion of the roller without interruption. The word "knurl" further comprises a series of small ridges or grooves on the surface or edge of a metal object to aid in gripping, so long as the ridges or grooves do not extend axially along a substantial portion of the roller without interruption. In one embodiment, the knurl is a protrusion in a pyramid configuration, with the peak of the pyramid extending perpendicularly from the axis of the roller. In one embodiment, both rollers 43, 44 are knurled in at least a knurled region 47. In one embodiment, the knurled region 47 comprises a middle region of the roller 43, 44, and the relief region 48 is formed adjacent at least one end region of the roller 43, 44. In other embodiments, at least a portion of knurled region 47 is adjacent at least one end portion of the roller 43, 44. For example, knurled region 47 may be immediately adjacent an end of roller 43, with a relief region 48 adjacent knurled region 47 and a second knurled region adjacent relief region 48. In other embodiments, a knurl as used herein includes, straight knurls, round knurls, splines or gear attachments. In another embodiment, each roller is covered by an elastomeric covering.

In one embodiment, first roller 43 includes a knurled region 47 between two relief regions 48 located at opposite ends of first roller 43, while second roller 44 comprises a knurled region 47 but does not include a relief region. In one embodiment, each relief region 48 comprises no more than approximately 20% of the length L of the roller 43.

In one embodiment, actuator 46 is substantially coaxial with at least one of the roller arms 43, 44.

Valve assembly 50 includes a front 51 and a back 52. When in a closed configuration, front 51 and back 52 are substantially parallel and adjacent each other. In another embodiment, front 51 and back 52 are hingedly attached at one side of each. In one embodiment, front 51 and back 52 are hingedly attached at the same end as front 24 and back 25. Front 51 and back 52, in one embodiment, are maintained in a closed configuration with a latch assembly 59. In one embodiment, the latch assembly includes a spring operable to bias the front 51 and back 52 into an open configuration. The latch assembly may be constructed either integrally with the front 51 and back 52, or the latch assembly may be affixed to the valve assembly 50 with any known means of attachment, including clips, hook and loop fasteners, snaps, screws, rivets, zippers, or the like.

In one embodiment, valve assembly 50 further includes a heating element (not shown) extending parallel with at least one of front 51 or back 52. In one embodiment, the heating element is configured to heat to 130 degrees Fahrenheit to heat the contents of bag 90. Other heating or cooling configurations are within the scope of this disclosure.

Front 51 and back 52, in one embodiment, further include at least one bag alignment indicator 57. In one embodiment, bag alignment indicator 57 comprises a pin affixed with one of front 51 and 52 configured to match a pin receiving hole integral with the other of front 51 and 52. The pin may be integral with one of front 51 and back 52. Bag alignment indicator 57 may be configured to mate with bag alignment indicators of a flexible bag, discussed below. In another embodiment, bag alignment indicators include flat pins with or without barbs or hooks. In one embodiment, bag alignment indicator 57 works in concert with at least one tang to guide placement of the bag

In one embodiment, track support 26 connects valve assembly 50 and roller frame 40 at approximately a midpoint of a length L of valve assembly 50. In one embodiment, track support 26 connects valve assembly 50 and roller frame 40 at approximately a midpoint of a length L of roller frame 40.

In one embodiment, back 52 includes a groove 101 configured to mate with a housing rail 645 (see FIG. 6) to provide additional support to system 10 and provide a sliding connection between back 52 and housing 5. In one embodiment, groove 101 is configured to slidingly engage with housing rail 645 (see, FIGS. 6, 7). In one embodiment, groove 101 includes a taper at the front or back of the groove to enhance alignment.

Valve assembly 50 further includes at least one spout receiving portion 55 (see FIG. 2). Spout receiving portion 55 is configured to receive a spout 93 of a flexible bag 90 containing product. Each spout receiving portion 55 is configured with complementary cut-out areas 56 on each of front 51 and back 52, as well as a valve 53 contained within the cut-out areas 56. Valve 53 is operably attached to an actuator 58 (see FIG. 7). In one embodiment, actuator 58 comprises a lever that is hingedly attached to the valve 53.

In yet another embodiment, valve 53 is actuated by the actuator 46 that actuates the rollers 43, 44. In such an embodiment, each valve 53 is connected with a link to the actuator 46, such that actuation of actuator 46 simultaneously actuates the rollers 43, 44 and valves 53. Actuation of actuator 46 drives a catch axial to the rollers, actuating a driving rod configured to be driven by the catch. In one embodiment, the driving rod is polygonal. Actuating the driving rod causes the rod to rotate about an axis that is non-parallel to the rollers. In one embodiment, the axis of the rod is substantially perpendicular to the axis of the rollers. Rotation of the driving rod causes translation of a valve catch in valve assembly 50. The valve catch is configured to be driven by the driving rod. In one embodiment, the valve catch includes a toggle. In another embodiment, the valve catch includes a rotatable lever configured to apply force to the valve. Translation of the valve catch opens and closes the valves 53. In one embodiment, the valve catch is configured such that valve 53 is locked in a closed configuration, while even a slight rotation of the driving rod causes the valve catch to disengage from its locked position, and valve 53 will open. One

embodiment of such a valve catch is as illustrated in FIG. 4, as valve catch 445. In another such embodiment, valve 53 is biased to a closed position with a spring biasing the actuator 46. Thus, in certain embodiments, actuator 58 may be the identical structure as actuator 46. Actuation of actuator 46 includes a variety of methods known in the art, such as rotation of a knob-type actuator by any appropriate degree of rotation, for example, 90 degrees, 45 degrees or 30 degrees.

The elements of an embodiment wherein actuator 46 actuates the valve 53 are shown in exploded view in FIG. 4. At 400, the actuator system 410 are illustrated as including knob 420, spring 415, receiver 423, driving element 425, driving disc 427, rod 430, valve element 435, actuator catch 440, and valve catch 445. Spring 415 biases the position of knob 420 relative to receiver 423. Receiver 423 mates with flights formed using conventional techniques into the outer surface of driving element 425 to rotate the rollers 42, 43 using driving disc 427 mated with the rollers, as described above. Rotation of knob 420 simultaneously results in the axial translation of actuator catch 440 by pressure applied to surface 441 at one side of leg 442. Leg 442 and actuator catch 440 rotate relative to each other about hinge 444. Actuator catch 440 includes a reception hole configured such that rod 430 snugly fits within reception hole 443. In one embodiment, rod 430 and reception hole comprise a hexagonal cross-section, although otherpolygonal shapes may be used. In one embodiment, rod 430 and the reception hole comprise a rectangular shape. Reception hole 443 is hingedly attached with hinge 444 to the remaining portion of actuator catch 440 such that axial translation of actuator catch 440 results in rotation of reception hole 443 and thus rotation of rod 430. Rotation of rod 430 results in axial translation of valve element 435 using similar principles – rotation of rod 430 causes translation of valve element 435. Reception hole 446 mates with hinge 444. Valve catch 445 also functions as an actuator catch.

Various embodiments of the invention include use of two knobs 420 – one on each side of the roller assembly. In embodiments using a single knob 420, valve catch 440 is an unnecessary element of the structure.

Valve 53 is configured to match the profile of a flexible bag. In one embodiment, valve 53 is configured to provide product from the contents of the flexible bag. In one embodiment, a flexible bag includes a spout receiving portion configured to match valve 53. In one embodiment, valve assembly 50 is configured such that at least a portion of a lower sealed region of a bag extends through the valve 53 such that the product dispensed by the bag does not contact the valve 53 during dispensing.

FIG. 7 is an underside view of valve assembly 50.

Referring now to FIGS. 1A and 1B, system 10 further includes a flexible bag 90 containing product to be dispensed. Bag 90 includes a product containment portion 92 and at least one spout receiving portion 93 in communication with the product containment portion. Product containment portion 92 is an interior region of the bag 90 defined by a top sealed support portion 94, and at least two sealed sidewall portions 91. Product containment portion is further defined by a lower sealed region 95 adjacent a bottom end 99 of the containment portion 92. In one embodiment, the lower sealed region 95 includes at least one bag alignment indicator 97, wherein the bag alignment indicator 97 allows alignment of the spout receiving portion 93 with a valve (e.g. valve 53) to position the spout receiving portion to receive a dispenser spout. In one embodiment, the bag alignment indicator comprises a hole configured to mate with a bag alignment pin in valve assembly 50. In one embodiment, bag 90 includes a single spout receiving portion 93, while in another embodiment bag 90 includes two spout receiving portions 93. In one embodiment, bag 90 is implemented as shown in United States Design patent application 29/203,851, filed April 16, 2004. In another embodiment, bag 90 comprises a tube sealed at its ends. In another embodiment, bag 90 is a bag sealed at only a single side.

In order to dispense the product contained within bag 90, a tear strip 96 is included. Tear strip 96 may be configured to be easily torn by hand, or may be configured to require a sharp implement to cut along the strip. In embodiments configured to be torn by hand, tear strip 96 may be perforated, or may comprise an area where lower sealed region 95 has reduced thickness relative to the remaining portions of lower sealed region 95. Tear strip 96, in one embodiment, is located so that the at least one bag alignment indicator 97 is disposed between the tear strip 96 and the product containment portion 92. In one embodiment, tear strip 96 includes an area without perforations, such as an area created by seal jaws with a dulled portion.

In the embodiment illustrated in FIG. 1A, bag 90 includes two spout receiving portions 93 configured to match two valves 53. In one embodiment, lower sealed region 95 comprises a triangular shape between the two spout receiving portions, such that any product contained in product containment portion 92 will be biased to flow to one of the two spout receiving portions.

In the embodiment illustrated in FIG. 1B, bag 90 includes a single spout receiving portion 93 disposed near an edge of lower sealed region 95. In such an embodiment, lower sealed region 95 is configured with a slope 89 such that any product contained in product containment portion 92 is biased to flow to the spout receiving portion. In one embodiment, the slope is an angle between approximately 1 degree and approximately 5 degrees.

Spout receiving portion 93 is configured to dispense the product contained within product containment portion. In one embodiment, spout receiving portion 93 is configured to mate with a spout 505 (see FIG. 5) to receive the product and convey the product to a desired location. In one embodiment, the spout includes an angle to dispense the product to a location other than directly below the spout receiving portion. In one embodiment, the spout is configured in an approximate "s" shape. In one embodiment, the spout is carried within a hinged housing 510 external to the system 10. In an embodiment, the hinged housing 510 comprises

a hinged attachment configured to attach to valve assembly 50. In another embodiment the spout is configured to dispense the product exterior to a housing carrying system 10.

Top sealed support portion 94 is configured to provide a region for support. In one embodiment, top sealed support portion 94 is configured to be supported by top 22. In another embodiment, roller frame 40 provides sufficient support when in a closed configuration. In one embodiment, top sealed support portion 94 is at an end of the food product containment portion opposite the lower sealed region 95.

In one embodiment, bag 90 is constructed of a flexible plastic capable of preserving the condiment at room temperature. In another example, bag 90 is a barrier bag. At least one of edges of the bag 94, 95, 91 are heat-sealed, and one or more openings spout receiving portions 93 are molded into the lower sealed region. In one embodiment, bag 90 comprises a flexible food grade plastic. In one embodiment, the bag comprises a bi-axially oriented nylon material laminated to an ethyl-vinyl-alcohol (EVOH) polyethylene or metallocene sealant. In another embodiment, the bag comprises a uni-axially oriented nylon or polypropylene laminated to an EVOH and then laminated to a linear low-density polyethylene (LLDPE) or metallocene sealant. Alternatively, the uni-axially oriented polypropylene or nylon can be laminated to a 5 to 7 layer EVOH – LLDPE sealant. In another embodiment, bag 90 comprises PVC, polystyrene, or high-impact styrene. Other embodiments include the use of linear low density blends as well as low density EVA blends. In one embodiment, the bag includes a material selected to tear uniformly along a desired tear strip without tearing up or down away from the desired tear strip.

In another embodiment, bag 90 is composed of a laminated material that provides uniform and consistent tearing properties at least in the region adjacent to and including the at least one spout receiving portion 93. One exemplary embodiment of bag 90 having uniform and consistent tearing properties is

composed of a three-ply laminated film. A first layer of the three-ply film is composed of 100 gauge (1 ml) uniaxially oriented polypropylene. The first layer is laminated to a second layer composed of 50 gauge (0.5 ml) biaxially oriented ethyl-vinyl-alcohol (EVOH). The second layer is laminated to 250 gauge (2.5 ml) linear low-density polyethylene. In one embodiment, bag 90 includes a barrier, while in other embodiments, bag 90 does not include a barrier.

In another embodiment, tear strip 96 is configured to include at least one locating hole to further guide tearing of the bag.

Another exemplary embodiment of bag 90 having the uniform and consistent tearing properties is composed of a two-ply laminated film. A first layer of the two-ply film is composed of 100 gauge (1 ml) uniaxially oriented polypropylene. The first layer is laminated to a second layer composed of 300 gauge (3.0 ml) EVOh/polyethylene.

In other embodiments, the bag is made from a multilayer coextrusion comprised of, but not limited to, polymers of Nylon, Polypropylene (PP), Low Density Polyethylene (LDPE), Ethyl vinyl alcohol (EVOH), Polyester (PET) and Linear Low Density Polyethylene (LLDPE)

In other embodiments, the bag is made from a lamination of, but not limited to, Oriented Polypropylene (OPP), Oriented Polyester (OPET), Oriented Nylon laminated to, but not limited to, Low Density Polyethylene (LDPE), Linear Low Density Polyethylene (LLDPE), Polypropylene (PP).

In other embodiments, the bag is made from a lamination of, but not limited to, Oriented Polypropylene (OPP), Oriented Polyester (OPET), Oriented Nylon laminated to, but not limited to, Oriented Ethyl vinyl alcohol (EVOH), Polyvinylidyne Chloride (PVdC), laminated to, but not limited to, Low Density Polyethylene (LDPE), Linear Low Density Polyethylene (LLDPE), Polypropylene (PP).

The bag of claim 1 wherein the bag contains a tear strip to promote uniform tear across the spout area.

The bag of claim 1 wherein the bag contains laser made perforations to promote uniform tear across the spout area.

In an exemplary embodiment, the system as described herein may be used to dispense condiments both in the "front of the store" and in the "back of store" using identical bags 90. Operation of the system entails providing a system 10 and a bag 90 containing product to be dispensed through the system 10. Roller assembly 40 is operated to configure roller assembly 40 into an open configuration. An upper portion of bag 90 is inserted between rollers 43, 44 such that the majority of product is located between the rollers 43, 44 and the lower sealed region 95. Roller assembly 40 is then operated to configure roller assembly to a closed and locked configuration. Roller assembly 40 is placed adjacent top clip 30, and if sufficient material of bag 90 is available for insertion into top clip 30, top clip 30 is operated to assume an open configuration, at least a portion of the sufficient material is placed between the arms of top clip 30 and top clip 30 is then operated to assume a closed configuration. Valve assembly 50 is operated to assume an open position and the lower sealed region 95 is placed between front 51 and back 52, such that at least one spout receiving portion mates with at least one valve 53, and the valve 53 is located between any tear strip 96 and the spout receiving portion. In embodiments with bag alignment

indicators, the bag alignment indicators 59, 97 are also aligned. Valve assembly 50 is then operated to assume a closed, and locked, configuration. An operator may choose to ensure that valve 53 is in a closed configuration such that the product containment portion 92 is insulated from the tear strip 96. Tear strip 96 is then torn, or a lower sealed portion is cut such that if valve 53 assumes an open configuration, product disposed in product containment portion 92 may be dispensed from the bag into the environment. In one embodiment, product is dispensed into a container, such as, for example, the container described in FIGS. 3A and 3B. In another embodiment, product is dispensed directly onto an area below valve 53.

In another embodiment, bag 90 is loaded into assembly 10 by first opening the top clip and bottom, valve assembly. The rollers remain closed and in a substantially parallel configuration. The bag is positioned over the tangs and bag locators, and the valve assembly is closed over the bag. The top portion of the bag is fed through the rollers until a nip is formed. Once the nip is formed, a sufficient portion of the bag is available to clip into top clip. Having fully supported the bag, the bottom of the bag is torn or cut off to enable dispensing of product from the bag into a dispenser.

FIG. 3A illustrates a dispenser 310 comprising a reservoir 311 that contains the condiment, a pump 312 that releases the condiment in controlled quantities, and a handle 313 with a trigger 333 that actuates the pump in accordance with one embodiment of the invention. Pump 312 may also be referred to as a positive displacement pump.

The reservoir 311 has an open top 320, sides 321, and a bottom 322. In one embodiment, the reservoir 311 is generally cylindrical, and the top 320 has a larger diameter than the bottom 322. In some embodiments, the top 320 is sized to facilitate easy refilling of the reservoir 311. In another embodiment, the dispenser 310 is substantially frusto-conical. Optionally, a cover (not shown) can be placed over the top 320 to reduce the likelihood of foreign matter falling into the reservoir 311. Additionally, a cover may reduce dehydration of the contents of the reservoir.

FIG. 3B illustrates the bottom 322 of one embodiment of a reservoir 311 comprising 5 holes 323. In other embodiments, the bottom 322 contains a plurality of holes 323. Holes 323 permit the condiment to exit the reservoir 311. The bottom 322 is sized and the holes 323 are spaced so that the dispenser releases the condiment onto a food product in a predetermined pattern, also called a diffusion pattern. Holes 323 may be arranged in any number of predetermined diffusion patterns. In one example, holes 323 are arranged at the vertices of a pentagon. In another example, holes 323 are arranged at the vertices of a square with an additional hole 323 at the center of the square.

The reservoir 311 is made, in one embodiment, of a single piece of a plastic that does not react with food products, is durable, and is easy to clean. In another embodiment, the reservoir 311 is constructed from a plurality of pieces that may be molded together or formed using any appropriate fabrication technique. In another embodiment, reservoir 311 comprises a high density polyethelene (HDPE) or other food grade plastic that is resistant to the contents of the reservoir. The embodiment shown in FIG. 3B incorporates a plurality of horizontal lines 324 on the walls of the reservoir 311 that indicate suggested minimum and maximum levels for the condiment in the reservoir. The horizontal lines 324 are molded, in one embodiment, into the walls 321 of the reservoir 311. In another embodiment, additional horizontal lines 324 are included to indicate other suggested fill levels, such as a level to fill at times during which the condiment likely will not be frequently used, such as, for example, late at night or during off-hours.

In one embodiment, handle 313 actuates pump 312. Actuation of pump 312 controls the flow of condiment from the reservoir 311. The handle 313 includes a fixed component 331 and a movable trigger 332, as shown in Fig. 3A. In the embodiment shown in FIG. 3A, the fixed component 331 is molded as an integral part of the reservoir 311. In another embodiment, fixed component 331 is hollow with an open bottom. Fixed component 331 and trigger 332 are configured so that trigger 332 actuates pump 312 and mates and is accepted into a hollow portion of the fixed component 331. In one embodiment, the fixed component 331 extends from the reservoir 311 at an angle that allows the dispenser to be disposed above a target with bottom 322 of the dispenser level with the food product. Thus, fixed component 331, in an embodiment, extends from reservoir 311 at an angle between 0 and 90 degrees. In such an embodiment, the operator's hand may attain an ergonomically neutral position.

The trigger 332 is functionally connected to the pump 312, and it is located on the handle 313. In one embodiment, an operator can hold the dispenser 310 and actuate the pump 312 with one hand. Several alternative structures exist that would perform the function of the trigger 332, but the trigger 332 shown in the drawings includes a lower arm 333, an axle 334, and an upper arm 336. The lower arm 333 extends below the fixed component 331 of the trigger 332 and between the fixed component 331 and the reservoir 311, where an operator can apply force to the lower arm 333 and actuate the trigger 332. Axle 334 operably and rotatably connects trigger 332 with fixed component 331. In one embodiment, axle 334 is substantially cylindrical and rotates within bearing pockets formed in the fixed component 331 of the handle 313. In one embodiment, the bearing pockets are substantially the same diameter as axle 334. In one embodiment, the bearing pockets are slotted to allow for removal of the arm. Upper arm 336 extends from axle 334 to the topmost element of the pump 312. When force is applied to lower arm 333 of trigger 332, trigger 332 rotates about the axle 334, moving upper arm 336 downward, and actuating

pump 312. In the embodiment illustrated in FIG. 3A, trigger 332 comprises finger grips configured to match the contours of a human hand. In other embodiments, trigger 332 is smooth.

In one embodiment, trigger 332 is configured so that the pressure applied to trigger 332 determines which of at least two volumes of product is released. For example, a two position trigger may dispense 5 grams of product if 5 foot pounds of pressure is applied to the trigger, and dispense 9 grams of product if more than 6 foot pounds of pressure is applied. The configuration actuates the pump to dispense a default volume of product, i.e. 5 grams in the above example, or a larger volume if desired. Such a configuration may be desirable, for instance, if two similar products are to receive the product. For example, a restaurant may serve two similar hamburgers – a hamburger featuring a quarter pound of hamburger and a hamburger featuring a half pound of hamburger. In this example, the quarter pound hamburger may receive a smaller volume of ketchup than the half pound hamburger, and this may be selected by the amount of force applied to the trigger. In one embodiment, the configuration of trigger 332 comprises a spring loaded stop block, such as female block assembly 391.

In one embodiment, fixed element 331 includes a female block assembly 391 configured to communicate with a male block assembly 390 of trigger 332. Male block assembly 390 mates with female block assembly 91 to stop trigger 332 in an actuated position.

Pump 312 comprises an upper column, a lower column, a piston 342 and a cylinder 343. As shown in FIG. 3A, upper arm 336 includes a cavity that receives the upper end of the upper column 340. The upper column 340 extends from the cavity 337 in the upper arm 336 to the lower column. The bottom of the upper column 340 is closed, and rests atop the lower column.

A vertical wall extends around the circumference of the bottom. Opening 345 is sized to accept bottom 347 and vertical wall 344, and is configured so that the edge of the vertical wall 344 connects with the edge of the piston 342. In operation, the vertical wall 344 forms an interface with the opening 345 of the piston 342 when trigger 332 is squeezed. Wall 344 severs or compresses any particulate matter that would interfere with an interface between upper column 340 and the piston 342. In one embodiment, vertical wall 344 is thinner than the reservoir 311.

Piston 342 rests in the upper chamber 348 of the pump cylinder 343, as shown in FIG. 3A. Piston 342 includes a central hole 349 through which the lower column 341 extends. Reservoir 311 and upper chamber 348 communicate through a plurality of piston holes 346. The piston holes 346 have walls that are chamfered so as to remove sharp edges at the top and bottom surfaces of the piston 342.

Pump cylinder 343 rests at the bottom of the reservoir 311. In one embodiment, pump cylinder 343 is sized to form an interface between the exterior of the cylinder 343 and the bottom of the reservoir 311. In one embodiment, the interface created between the exterior of cylinder 343 and the bottom of reservoir 311 prevents the condiment from leaking around the cylinder. In addition to the upper chamber 348, described above, pump cylinder 343 includes a lower chamber 350 and a partition 351 that separates the upper chamber from the lower chamber. Like the piston 342, the partition 351 has a central hole 352 through which the lower column 341 extends and a plurality of holes 353. In one embodiment, the holes 353 are chamfered to remove sharp edges at the top and bottom surfaces of the partition. A cylindrical vertical wall 354 extends below the partition 351 and forms an interface with the bottom plate 355 of the lower column 341. In one embodiment, vertical wall 354 is thinner than the walls of the reservoir 311. In operation, the vertical wall 353 severs or

compresses any particulate matter in the condiment, thereby improving the interface between the pump cylinder 343 and the bottom plate 355 of the lower column 341.

As shown in FIG. 3A, the top of the lower column 341 is in contact with the bottom of the upper column 340. The lower column 341 has a bottom plate 355 that fits into the thin vertical wall 354 of the pump cylinder 343 to interface, as described above. Upper plate 356 of lower column 341 is positioned below the piston 342. The upper plate 356 is positioned so as to engage the piston 342 but not to obstruct the piston holes 346. A spring (not shown) biases lower column 341 to form a seal between bottom plate 355 and pump cylinder 343. The spring further biases lower column 341 so that the piston 342 is located near the top of the upper chamber 348 when the trigger 332 is not actuated.

The operation of the embodiment of the invention shown in FIG. 3A is as follows. When the trigger 332 is not depressed, the lower column 341 is positioned so that the bottom plate 355 forms a seal with the vertical walls 354 of the pump cylinder 343. The piston 342 is positioned at the top of the upper chamber 348, and a gap exists between the piston and the upper column 340. In this position, the condiment can flow from the reservoir 311 through the gap between the piston 342 and the upper column 340 and through the piston holes 346 into the upper chamber 348 of the pump cylinder 343. The seal between the bottom plate 355 and the vertical walls 354 of the pump cylinder 343 prevents the condiment from flowing into the lower chamber 350 and exiting through the holes 323 in the bottom 322 of the dispenser 310.

On actuation of trigger 332, the vertical wall 344 moves downward and engages with wall 345 of the piston 342, forming an interface that prevents further condiment from flowing into the upper chamber 348. The action of the trigger 332 also moves the lower column 341 downward, which forms a gap between the bottom plate 355 and the pump cylinder 343 due to pressure of the condiment, permitting condiment in the upper chamber 348 to flow through the

holes 353 of the pump partition 351 and out the holes 323 in the bottom 322 of the dispenser. Further action of the trigger 332 depresses the piston 342, thereby forcing the condiment in the upper chamber 348 out of the dispenser.

When the trigger 332 is released, lower column 341 moves upward as biased by the lower spring, restoring the interface between the bottom plate 355 and the vertical walls 354 of the pump cylinder 343. The upper plate 356 engages the piston 342 and moves piston 342 upward to its original position near the top of the upper chamber 348. The upper column 340 is biased upward by the upper spring, restoring the gap between the piston wall 345 and the vertical wall 344. In this position, condiment flows into the upper chamber 348 but not the lower chamber 350, and the dispenser 310 is ready to be used again.

A container in accordance with the embodiments illustrated in FIGS 3A and 3B may be constructed of modular components that may be disassembled and reassembled.

FIG. 14 illustrates another embodiment of a dispenser in accordance with another aspect of the invention. FIG. 14 illustrates a dispenser 1400 including a dual knife blade pump assembly with a check valve.

Dispenser 1400 includes a trigger 1405 operably connected to rod 1410. In one embodiment, trigger 1405 is manufactured as a unitary piece, including protrusions configured to mate with holding gaps 1407 manufactured into a receptacle 1408 of grip 1409. Grip 1409 further includes stop block 1475. Stop block 1475 is configured to control the distance that can be traveled between trigger 1405 and grip 1409. In one embodiment, stop block 1475 is removable and configured to control the amount of product dispensable with dispenser 1400. For example, one stop block is configured to allow trigger 1405 to displace a certain distance to dispense 5 grams of product. In another example, a different stop block is configured to allow trigger 1405 to displace a different distance to dispense 3 grams of product. In another example, stop block 1475 is configured with a spring load to enable multiple levels of product dispensing. For

example, a spring loaded stop block is configured so that displacing trigger 1405 until the handle meets the resistance from the spring dispenses 5 grams of product, while continuing the displacement and overcoming the spring resistance results in dispensing 7 grams of product. In other embodiments, stop block 1475 is configured to mount to trigger 1405.

Trigger 1405 is configured to slide through receptacle 1408, such that when properly assembled trigger 1405 is disposed between handle portion 1409 and the body of container 1420. This configuration is illustrated in FIGS. 17 (trigger 1405 in a non-deployed position) and 18 (trigger 1405 in a deployed position). Operation of trigger 1405 moves handle closer or farther away from a lower surface 1498. In other words, if a human holds dispenser 1400 in their right hand, in a 'hand-shaking' fashion, the user's fingers surround trigger 1405 while a palm of the hand surrounds grip 1409. Application of pressure by the user's fingers moves the trigger 1405 about axis 1493 and closer to handle portion 1409 in "gripping" fashion. In one embodiment, trigger 1405 includes finger guard 1404 configured to facilitate handling dispenser 1400. In another embodiment, trigger 1405 includes rest position blocks 1401 configured to limit trigger upstroke.

Dispenser 1400 includes a container 1420. Container 1420 includes a containment portion 1421 configured to hold product within dispenser 1400. Container 1420 further includes grip 1409, and at least one wing 1423. In one embodiment, wing 1423 is configured as a protrusion extending outward from an outer wall of the containment portion 1421 and substantially perpendicular to an axis extending through a centerline 1426 of the product area. In one embodiment, the at least one wing 1423 is shaped to mate with a wing receptacle of a dispenser support (FIG. 16D). In one embodiment, wing 1423 comprises a vertical ridge. In one embodiment, wing 1423 is any structure configured to guide placement of the dispenser. In one embodiment, at least one wing 1423 is manufactured integrally with container 1420. In one embodiment,

wing 1423 is configured to prevent 'painting' or spreading of the contents of a dispenser upon a roller assembly or a housing supporting the roller assembly. In one embodiment, a wing 1423 reduces mess involved in operation of the dispenser, facilitating clean up. In another embodiment, container 1420 includes visual indicators 1422 for at least two fill levels. For example, container 1420 includes a visual indicator for a minimum fill level, a maximum fill level and a "night" fill level. Container 1420 further includes dual knife blade pump assembly 1440, described in further detail in FIG. 15 below.

Trigger 1405 is configured to rotate about an axis 1493 between the protrusions when fitted into the gaps 1408. Thus, in operation, trigger 1405 rotates about axis 1493 to bring trigger 1405 closer or farther from grip 1409. Trigger 1405 is, in one embodiment, configured to actuate the dual knife blade pump assembly.

Dispenser 1400 further includes a removable cap 1430. In one embodiment, removable cap is configured to be screwed on to a cap portion 1431 of container 1420. Cap 1430 includes a top surface 1432 and bottom surface 1433. Top surface 1432 is configured to be in contact with product prior to dispensing the product, while bottom surface 1433 is opposite top surface 1432. Cap 1430 includes at least one hole 1437 (FIGS. 16A, 16B) extending through the cap 1430 and extending from top surface 1432 through to bottom surface 1433 and configured to dispense the product contained in container 1420. The holes are configured to create a diffusion pattern, and each hole has a diameter configured to affect the diffusion pattern of the product and may also be configured to dispense particulates contained in the product. For example, a cap 1430 configured to dispense Thousand Island dressing must have holes with a diameter sufficient to dispense the particulates contained in Thousand Island dressing. In another embodiment, cap 1430 includes single filers disposed on top surface 1432 to direct product flow through the holes and to direct any particulates to line up single file for dispensing through the holes. See, FIG. 16E,

below. In one embodiment, the single filers are manufactured into top surface 1432. In another embodiment, top surface 1432 is chamfered to improve product flow. In another embodiment, dispenser 1400 is one element of a system to dispense product, the system further including a plurality of matched removable caps. In embodiments featuring a plurality of matched removable caps, the caps may also be matched with stop blocks to control the amount of product dispensed.

FIG. 16A illustrates one embodiment of a cap 1430 in accordance with one embodiment of the invention. As illustrated in FIG. 16A, cap 1430 features 5 holes 1437. FIG. 16B illustrates one embodiment of a cap 1430 in accordance with one embodiment of the invention. As illustrated in FIG. 16B, cap 1430 features 3 holes 1437. FIG. 16E illustrates another embodiment of a cap 1430 in accordance with another aspect of the invention. FIG. 16E shows top surface 1432 of cap 1430, including 3 holes 1437 and single filers 1499. In one embodiment, single filers 1499 comprise a groove chamfered into top surface 1432 to guide movement of particulate matter through holes 1437. Single filers 1499 comprise a groove with increasing depth, i.e., a deeper cut through cap 1430, approaching holes 1437. FIG. 16E additionally illustrates screw threads 1998 cut or formed into cap 1430 for attachment to container 1420, although any other appropriate means may be used for attachment, including snap fitting, hinge or bayonet style attachments.

FIG. 16C illustrates a top view of a dispenser support 1686 in accordance with one aspect of the invention. Dispenser support 1686 includes wing receptacle 1667 formed within the dispenser support. Wing receptacle 1667 is configured to engage with a wing portion 1423 of dispenser 1400. FIG. 16D illustrates a perspective view of dispenser support 1686 in accordance with one aspect of the invention. FIG. 16D further shows wing receptacles 1667 formed in dispenser support 1686. Wing receptacles 1667 include wing engagement portion 1668 formed within the dispenser support 1686. As shown in FIGS. 16C

and 16D, dispenser support 1686 is configured with two wing receptacles 1667. It is apparent that any number of wing receptacles 1667 may be formed in a dispenser support 1686. In one embodiment, wing engagement portion 1668 includes wing locator 1669 configured to indicate that a product containment portion, i.e. product containment portion 1421, is in its desired position, and that dispenser 1400 is appropriately positioned. In one embodiment, dispenser support 1686 is configured to attach to a housing, such as housing 5, below a dispenser, such as the roller assembly previously discussed.

FIG. 15 illustrates one embodiment of a dual knife blade pump assembly 1440 in accordance with one embodiment of the invention. Trigger 1405 actuates the pump assembly, and in one embodiment, is implemented as trigger 1405 as described above with reference to FIG. 14.

Trigger 1405 operably connects to rod 1510. In one embodiment, trigger 1405 attaches to rod 1510 with a snap, although other connection methods are anticipated and included in this disclosure. Rod 1510 includes a lower region 1513. Lower region 1513 includes first knife blade receptacle 1520. First knife blade receptacle 1520 is configured to mate with first knife blade 1530. In one embodiment, first knife blade receptacle 1520 is a chamfered surface formed in lower region 1513 and configured to closely meet with first knife blade 1530. First knife blade 1530 and first knife blade receptacle 1520 forms an upper knife blade assembly. Manufacturing tolerances for the upper knife blade assembly should be tight, as engagement between first knife blade 1530 and first knife blade receptacle 1520 is especially beneficial for the invention. It should be noted that although metallic knife blades may be used to create a relatively sharp knife edge, metallic knife edges are not necessary, and first knife blade 1530 and first knife blade receptacle 1520 may be molded from plastics or other material as a unitary part.

Piston 1540 includes first knife blade 1530 and includes at least one product opening to allow product to flow from around rod 1510 and through piston 1540 to cylinder 1550. In one embodiment, each product opening is chamfered to minimize the number of surfaces with a plane perpendicular to an axis 1501 running through a centerline of dual knife blade pump assembly 1440. Piston 1540 slides along pin 1543. In one embodiment, pin 1543 is made as unitary construction with rod 1510, while in other embodiments, pin 1543 is a separate piece configured for operable attachment to rod 1510. Although pin 1543 is shown in FIGS 14 and 15 as disposed between rod 1510 and piston 1540, in one embodiment, pin 1543 is disposed between piston 1540 and spring 1545. This embodiment is illustrated in FIG. 16F.

It should be noted that first knife blade 1530 could be disposed upon rod 1510 and that first knife blade receptacle 1520 could be configured on piston 1540, and that such a configuration is considered the equivalent.

First knife blade 1530 is disposed on an upper surface 1531 and configured to mate with first knife blade receptacle 1520. Piston 1540 further includes a lower surface 1532 including an upper spring seat 1537. As shown in FIG. 16F, upper spring seat 1537 is disposed on pin 1543. Returning to FIG. 15, upper spring seat 1537 is configured to meet with spring 1545 so as to provide a surface resistive to forces applied by spring 1545. Forces may be applied to spring 1545 by upper spring seat 1537 or by lower spring seat 1548.

Cylinder 1550 surrounds spring 1545 and is operably disposed within product portion 1495 of FIG. 14. Cylinder 1550 is configured for sliding engagement within product portion 1495 such that cylinder 1550 may be easily removed from product portion 1495, e.g. for cleaning. In one embodiment, the inner diameter of product portion 1495 is substantially the same as the outer diameter of cylinder 1550 for a snug fit. Cylinder 1550 includes an inner wall and an outer wall. The inner wall of cylinder 1550 includes lower spring seat 1548. In one embodiment, lower spring seat 1548 comprises a section of the inner wall

with a smaller inner diameter creating a surface substantially perpendicular to axis 1501 wide enough to support spring 1545. Cylinder 1550 further includes openings 1555 configured to allow fluidic communication between an area surrounding spring 1545 and valve 1560. In one embodiment, cylinder openings 1555 are configured without surfaces perpendicular to axis 1501. In one embodiment, each surface of cylinder 1550 is chamfered. In another embodiment, each cylinder openings 1555 includes single filers chamfered to channel any particulate matter through a cylinder openings 1555. Cylinder 1550 further includes valve guide 1565 configured to guide displacement of valve 1570 along axis 1501. Cylinder 1550 further includes second knife blade 1580 configured to mate with valve knife blade receptacle 1590. In one embodiment, cylinder openings 1555 comprise holes.

Valve 1570 displaces along axis 1501 to dispense product, guided by valve guide 1565. Valve 1570 further includes second knife blade receptacle 1590 and bottom spring seat 1595 configured to provide a surface for spring 1575. The combination of second knife blade 1580 and second knife blade receptacle 1590 forms a lower knife blade assembly. The upper knife blade assembly and lower knife blade assembly form a dual knife blade assembly. Manufacturing tolerances for the lower knife blade assembly should be reasonably tight, as engagement between second knife blade 1580 and valve knife blade receptacle 1590 is especially beneficial for the invention. It should be noted that although metallic knife blades may be used to create a relatively sharp knife-edge, metallic knife-edges are not necessary, and second knife blade 1580 and second knife blade receptacle 1590 may be molded from plastics or other material as a unitary part.

It should be noted that second knife blade 1580 could be disposed upon valve 1570 and that second knife blade receptacle 1590 could be configured on cylinder 1550, and that such a configuration is considered the equivalent.

Operation of dispenser 1400 is described as follows, referencing FIGS. 14, 15, 17 and 18. In operation, dispenser 1400 operates to dispense controlled amounts of a fluid, such as a condiment. For example, dispenser 1400 dispenses controlled amounts of tartar sauce, ketchup, or Thousand Island dressing. The dual knife blade assembly of pump 1440 is especially well suited for fluids containing particulates, i.e., Thousand Island dressing, although the pump is equally suited for fluids that do not contain particulates, i.e., ketchup.

When dispenser 1400 has no product contained in cylinder 1550, the dual knife blade pump assembly must be primed for its first use. It should be noted that so long as the amount of product in containment portion 1421 does not fall below a certain "minimum level," no further priming is necessary until dispenser 1400 is emptied of product again, such as for cleaning.

Priming the dual knife blade pump assembly comprises filling cylinder 1550 with product. Prior to priming, trigger 1405 sits at rest in a non-deployed position. Actuation of trigger 1405 to operate dispenser 1400 moves trigger 1405 closer to grip 1409. Movement of trigger 1405 displaces rod 1510 axially along axis 1501. When rod 1510 is at its uppermost position (trigger 1405 is in its non-deployed position), product in containment portion 1421 flows around lower region 1513 and through holes 1531, filling cylinder 1550 with product. When space in the pump assembly has been filled with product, the dual knife blade pump assembly is said to be primed.

After priming, dispenser 1400 is set to dispense product. Dispenser 1400 is shown in a configuration ready to dispense product in FIG. 17, and in a deployed configuration in FIG. 18. Again, rod 1510 is displaced along axis 1501 by trigger 1405. Displacement of rod 1510 in direction A moves piston 1540 in direction A after the first knife blade engages, and forces product within cylinder 1550 through holes 1565 and through valve 1570, over knife blade receptacle 1590 and through cap 1430. As piston 1540 comes in contact with rod 1510, first knife blade receptacle 1520 meets first knife blade 1530. Contact between first

knife blade receptacle 1520 and first knife blade 1530 creates a seal, and effectively or substantially severs or compresses any particulate that is disposed between the complementary surfaces of first knife blade receptacle 1520 and first knife blade 1530. Movement of piston 1540 in direction A loads spring 1545. Further, movement of the product over valve 1570 loads spring 1575.

Having dispensed the product contained within cylinder 1550, trigger 1405 returns to its non-deployed position, displacing rod 1510 in direction B. Displacement of rod 1510 effectively breaks the interface between first knife blade receptacle 1520 and first knife blade 1530. The removal of the force applied in direction A removes the forces from spring 1545 and dispensing the product reduces the forces from spring 1575, allowing each spring to unload its loaded force, biasing rod 1510 in direction B. Unloading spring 1575 moves valve 1570 in direction B until second knife blade 1580 and second knife blade receptacle 1590 meet. The contact between second knife blade 1580 and second knife blade receptacle 1590 creates an effective seal, and effectively or substantially compresses or severs any particulate that is disposed between the complementary surfaces second knife blade 1580 and valve knife blade receptacle 1590. Product then flows into cylinder 1550, as valve 1570 has closed, and piston 1540 has separated from cylinder 1550 moving through the product, creating a gap between first knife blade receptacle 1520 and first knife blade 1530.

When dispensing relatively viscous products, suck back created by movement of the piston 1540 assists in moving the valve and releasing forces from spring 1575. Additionally, suck back will assist in reducing undesired product drip from the removable cap.

During operation as described herein, when the valve is open, the first knife blade 1530 engages with first knife blade receptacle 1520. Conversely, when the valve is closed, the second knife blade 1580 engages with second knife blade receptacle 1590. In one embodiment, engagement between the respective knife blades and knife blade receptacles creates a seal.

In one embodiment, stop block 1475 and cap 1430 are a matched pair, such that stop block 1475 is configured to be removable from grip 1409. For example, both stop block 1475 and cap 1430 are colored red for a dispenser configuration to dispense ketchup. In another example, both stop block 1475 and cap 1430 are colored white for a dispenser configuration to dispense tartar sauce. In other embodiments, stop block 1475 and cap 1430 are inscribed with writing to indicate either a product to be dispensed, or an amount of product to be dispensed. In another embodiment, the trigger is configured to actuate the pump assembly. In yet another embodiment, the trigger includes a stop block configured to control the amount of product dispensed with a single pump actuation.

In another embodiment, stop blocks 1475 are a portion of the trigger, and the triggers are matched to the removable cap.

FIG. 8 illustrates one embodiment of a housing for a system 10 in accordance with one aspect of the invention. As illustrated in FIG. 8, housing 810 includes a hinged door 820 providing selective access to an interior portion (not shown) of housing 810. Housing 810 further includes a base portion 830, support portion 840 and product portion 850. Product portion 850 includes an interior region configured to entirely enclose system 10 as described in FIGS. 1 and 2 with a bag 90 as described in FIGS. 1A and 1B. Housing 810 further includes a gap 860 configured to be in sliding engagement with actuator assembly 49 such that as product is dispensed from bag 90, actuator 46 descends along gap 860. Base portion 830 may include spill portion 831. As better illustrated in FIG. 5, housing 810 provides access for a spout 505 to dispense the product contained within bag 90.

FIG. 9 illustrates one embodiment of a "front-of-store" system in accordance with one embodiment of the invention. FIG. 9 illustrates a housing 905 for enclosing system 10 as described above. Housing 905 includes hinged doors 920 and 921 rotatable between a closed configuration wherein doors 920 and 921 abut each other and an open configuration wherein doors 920 and 921 are not abutting. Housing 905 further includes a base portion 930 and product portion 950. Doors 920 and 921 include a locking device 925 configured to maintain doors 920 and 921 in a closed configuration. As depicted in FIG. 9, locking device 925 comprises a slotted configuration, although those of ordinary skill in the art will readily recognize a number of other locking devices 925 that would be operable to maintain doors 920 and 921 in a closed configuration. Such other locking devices may comprise hook and loop fasteners (e.g. Velcro®-brand fasteners), zippers, snaps, screws, rivets, latches or other similar devices. Locking device 925 may also comprise means to secure a padlock or similar security device to the locking device 925 to reduce incidence of unauthorized access to product portion 950. A cup dispenser may be affixed to a side of the housing 905 to dispense soufflé cups. The dispenser may dispense paper soufflé cups, as known in the art, or modified cups as described below.

Housing 905 further includes support clip 945. Support clip 945 is configured to mate with spout housing 1005 (described below in FIG. 10). Spout housing 1005 slides into locking engagement with support clip 945 to position spout 1010 in a predetermined position.

In other embodiments, housing 905 includes a single door configured to enclose the product portion while in a closed configuration and allow access to the product portion while in an open configuration. A locking device in such an embodiment would be configured to lock the door to the product portion.

FIG. 10 illustrates one embodiment of spout housing 1005 mated with support clip 945 of FIG. 9 in accordance with one embodiment of the invention.

FIG. 11 illustrates one embodiment of support clip 945 in accordance with one embodiment of the invention.

FIG. 12 illustrates one embodiment of spout housing 1005 in accordance with one aspect of the invention. Spout housing 1005 comprises two wings 1220 and 1230, hingedly attached at hinge 1250 for rotation between an open configuration (pictured in FIG. 12) and a closed configuration (pictured in FIG. 10). Spout housing 1005 may further include spout locator 1240 configured to accept spout 1010 (FIG. 10) and at least a portion of bag 90 (FIG. 10).

Spout 1010 is configured so that only spout 1010 is in contact with the contents of bag 90 in one embodiment. Thus, in such embodiments, bag 90 and spout 1010 are configured so that the interior of bag 90 is in fluidic communication with an interior of spout 1010.

FIG. 13 illustrates an alternative embodiment of a valve assembly, in accordance with another aspect of the invention. Valve assembly 50, as illustrated in, e.g., FIG. 2A, comprises a t-shaped groove to mate with a support rail. FIG. 13 illustrates valve assembly 1349 comprising a straight walled groove 1360, such that valve assembly 1349 is configured to not move laterally when in position – placing or removing valve assembly 1349 into a supported position along a support rail requires angling valve assembly (and assembly 10) to allow clearance of the sidewall.

In another embodiment, valve assembly 50 includes a pump to meter the amount of product dispensed from the bag. In one embodiment the pump is a peristaltic pump. In one embodiment, the peristaltic pump meters out 2 grams of ketchup. In another embodiment, the peristaltic pump meters out an amount of product calibrated to fill a soufflé cup. The peristaltic pump may be powered, or rely on gravitational forces for measurements. In other embodiments, the assembly 10 includes a peristaltic pump that is not a part of valve assembly 50. In another embodiment, the pump is a peristaltic pump.

A modified soufflé cup receives the output of the bag in one embodiment. Such a soufflé cup comprises a cup that has a substantially circular bowl shape, with its width greater than its height. In one embodiment, the modified cup includes an arced dipping angle created by the base of the cup as it flows into the walls of the cup. In one embodiment, the modified cup includes a flanged portion of the wall at its terminus. Such a modified cup may provide a user with the impression of holding a great deal of product, while holding a smaller amount than prior art paper soufflé cups known in the art. The cup may comprise polylactic acid, paper, plastics, or any other material known. The cups may be stored in a container affixed to the side of housing 905 as illustrated in, e.g. FIG. 9. The container for the modified cups may include a bottom portion to support the cups at their base, rather than at a flanged upper portion of the cup, wherein the bottom portion includes a groove configured to allow a user to remove a single cup at a time by angling the cup for removal. In addition to the substantially circular bowl shape, a number of other shape configurations are possible, including square, diamond, triangular, or other polygonal configurations, each of which is encompassed by this disclosure. In one embodiment, the shape of the soufflé cup is configured to minimize product waste during use.

Hinged attachments described herein may comprise any number of known hinge assemblies. For example, a hinged attachment includes a pin inserted through the hinged parts, and the hinged parts rotate about the axis of the pin. In another example, the hinge is externally affixed to the devices, such that the devices rotate about the axis of the external hinge. External hinges may be affixed to the device using known means, such as adhesives, screws, hook and loop fasteners such as Velcro-brand fasteners, etc. Thus, the components of hinged attachments may be integral with other structures.

Those of ordinary skill in the art will readily recognize that bag 90 may contain any number of consumer and commercial products. Bag 90, for example, may contain food products, such as ketchup, mustard, and other condiments. In another example, bag 90 may contain sanitizers, soap or other cleaning products. In another example, bag 90 may contain healthcare products. In another example, bag 90 contains salad dressing or pasta sauces. In another example, bag 90 contains glue. In another example, bag 90 contains pancake batter, or an egg batter. In another example, bag 90 contains chemicals or other industrial products.

Those of ordinary skill in the art will readily recognize that the parts of system 10 other than bag 90 may comprise any appropriate material or materials. Thus, the structural components, such as frame 20, top clip 30, roller frame 40, valve assembly 50, housing 5 and dispenser 15 may be plastic, PVC plastic, metal, steel or any other appropriate material or combination of materials. In one embodiment, the gripping connections between the front of an assembly or clip may include steel portions mating with plastic portions of the back of the assembly or clip. In another embodiment, track 26 comprises stainless steel or similar material.

One embodiment of the invention includes the use of more than one system 10 in a modular system. Using a plurality of systems 10 in a modular system allows the operator to provide a plurality of condiments, for example, in a single location. Modular systems may provide a smaller footprint, conserving space utilization.

FIG. 19 illustrates one embodiment of a method 1900 for dispensing product in accordance with one aspect of the invention.

Method 1900 begins at step 1910. At step 1920, a flexible product filled bag is secured in a roller assembly. In one embodiment, the flexible product filled bag is implemented as bag 90. In one embodiment, the roller assembly is implemented as described in FIGS. 1, 2A and 4-7.

After securing the bag, method 1900 translates the roller assembly relative to the product filled bag at step 1930. Having translated the roller assembly, method 1900 forces product within the bag toward a valve assembly in step 1940. In one embodiment, the valve assembly is implemented as valve assembly 50 described above. In one embodiment, forcing product within the bag toward a valve assembly includes cutting any particulates contained within a particulate condiment.

Having forced the product toward the valve assembly, method 1900 dispenses the product through the valve assembly in step 1950.

FIG. 20 illustrates one embodiment of a system 2000 for dispensing condiments. System 2000 includes dispenser 1400 supported in housing 5 by wing receptacle 1686, and disposed in a dispensing position adjacent roller assembly 10 supporting bag 90. As shown in FIG. 20, a dispenser system includes a roller assembly supporting a flexible bag, and a dispenser positioned below the flexible bag and positioned to be filled by the flexible bag, the dispenser including a pump assembly having first and second blades to compress particulates within a particulate condiment.

As used herein, the term "cutting" includes compressing, severing, squeezing or similar actions that may or may not result in division of an object.

While the embodiments of the invention disclosed herein are presently considered to be preferred, various changes and modifications can be made without departing from the spirit and scope of the invention. The scope of the invention is indicated in the appended claims, and all changes that come within the meaning and range of equivalents are intended to be embraced therein.